A Taxonomy for Insourcing in the Aerospace Industry

Graduate Research Project

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Abstract

The executive and legislative branches agree that there has been too much outsourcing of government work in the past. The best option is a combination of insourcing and outsourcing, which has traditionally been the way the government has conducted business. Bringing a service back in house, or insourcing as it is known, is a difficult decision that cannot be based on cost alone. Cost does not reveal the whole picture and it would suggest that the decision to outsource should not be based only on cost. Ultimately the question is under what conditions should a process or service be insourced? The Office of Management and Budget (OMB) circulars and Government Accounting Office (GAO) reports provide general guidelines for such decision making but nothing truly definitive. There is current literature suggesting frameworks for the various aspects of the process, but no framework exists for the entire process. The purpose of this paper is to develop a taxonomy so that a decision framework can be developed that considers the optimal solution for the long term financial gain, corporate strategy, and continued sustainment of the corporation in the insourcing decision process.

A review of current literature for this paper suggests that such a decision needs to be based on six categories: cost, corporate knowledge and economic environment, knowledge, laws and regulations, relationships, and metrics and monitoring. These are quantifiable factors that a manager can base the decision on. However the insourcing

decision must also consider factors that are interwoven throughout the process. They are time, trust, common goals, and cash flow.

To My Husband, Father, and Mother

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Rachel Henderson Ghai

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Chapter 1

Introduction

A 2010 study by Forbes and Lederman on vertical integration of the airline industry found that when a regional airline is owned by a major airline the service by that major airline increases. The term vertical integration in this sense is used to mean insourcing. When the regional airline is owned by the major airline the average delay was 2.3 minutes shorter. Delays caused by inclement weather were further decreased to a total of 5.6 minutes. Their research found that when schedule adaptation solved optimally is necessary to a major airline, an owned regional jet by that major airline is less costly. A regional jet under contract obligations only to a major airline also competes with that same major airline for that same route and was found to have suboptimal schedule service. Schedules can be disrupted for many reasons and is not specified in a contact. "Having rights or ordering specific schedule changes is not equivalent to having the right to implement those schedule changes" (Page 787).

Since the regional and major may be competing for the same resources such as crew, parts, gates, etc. the regional will give priority to their own schedule and not the major, especially if they are trying to attract new business (Forbes and Lederman 2010). If insourcing is better when adaptability, flexibility, and cost are needed; why do businesses

outsource and what is considered in the insourcing/outsourcing decision process especially for the aerospace defense industry?

The National Defense Authorization Act for the Fiscal Year 2008 states that the Department of Defense (DoD) should develop insourcing guidelines by July 2009. Prior to that in May of 2009 the DoD issued their own guidelines for implementing insourcing. According to the DoD Department of Personnel and Readiness the insourcing guidelines stated by Title 10 of the US Code were interpreted to mean:

> "reduce reliance on contracted service, appropriately realign inherently governmental and critical work from the private sector to government performance, generate efficiencies and savings, and ensure the Department has the necessary capabilities and skills to meet its missions"

On 6 October 2009 the Government Accounting Office (GAO), which is under the legislative branch of government, issued a report titled "Insourcing Guidelines" and found that in the 5 years prior $100 billion on average was spent annually on contracting out or outsourcing services. This report, which also included general guidelines from the Office of Management and Budget (OMB), issued insourcing guidelines. However, these guidelines are mostly geared toward the issue of manpower.

1. provide framework for "managing the multisector workforce built on strategic human capital planning.
2. each agency should conduct analysis of organization, program, project, or activity where there are concerns about reliance on contractors and report the pilot in April 2010
3. provide criteria on how agencies can use insourcing as a tool to manage the multisector workforce (GAO-10-58R: 2)

While the above are general guidelines it was recognized that there are overarching general challenges to insourcing in government agencies which are:

1. coordinating the functional parts of an agency
2. coordinating the work with each other to determine work needed and number of positions needed
3. culture change from outsourcing to insourcing (GAO-10-58R: 6-7)

The 20 May 2010 GAO report GAO-10-744T also recommended the following tools be used:

1. identification of just what those inherently governmental functions are
2. using a BCA to determine if insourcing will fulfill mission requirements
3. determine if there is human capital to fill in house positions

Within this broad general framework are operational considerations as well. Problems:

1. infrastructure- managers must coordinate activities, insourcing can be a complex process
2. culture- shift from contractor to contractor and federal worker
3. data- difficulty in getting the data needed to make insourcing decisions (GAO-10-744T: 9-10)

1.1 Background

Bringing a service back in house, or insourcing as it is known, is a difficult decision that cannot be based on cost alone. Cost does not reveal the whole picture and it would suggest that the decision to outsource should not be based on total cost alone. Government guidelines and terminology on insourcing are vague and still evolving.

Guidance from the OMB can be confusing as that office falls under the executive branch of government and guidance from the GAO can be confusing as it falls under the legislative branch of government. The OMB has even stated they cannot specifically define what their role will be the insourcing process because it is still evolving. Furthermore these guide lines have all been in reference to manpower.

There is little current research on insourcing in private industry. The term most frequently used to mean insourcing in literature is vertical integration. This is defined as bringing a process back in house, the make versus buy decision, or buying a supplier of goods or services. This purchase of a supplier by the corporation is to have better control of the production process and risk management (Williamson 1971 and Teece 2010). To vertically integrate or not has also been framed in terms of transaction cost economies theory which means that bringing a capability in house is based on the cost involved. How this would help a firm achieve a strategic position in the market or a sustainment level is not emphasized if it is even considered.

The theory of resource based value views resource availability as way to gain a strategic or sustainment position for the corporation in the market place so that it has a competitive advantage. Insourcing framed in this context views obtaining resources via outsourcing as a means of achieving a competitive advantage not just a cost savings mechanism (Barney 1996 and Gulbrandsen, Sandvik, and Haugland 2009).

The trend in business has thus far been outsourcing, and it has been in terms of transaction cost economies and resource based values. This means that when deciding to outsource a good or service a corporation considers cost but also what gives them a competitive advantage. Even though both theories are used as the basis for outsourcing,

most of the outsourcing decisions have been based on cost alone as that is easier to quantify. Reasons to outsource based on strategic positioning and competitive advantage are much less so. Since a quantifiable reason is easily justified to all concerned parties and easier to defend if that decision turns out to be bad; outsourcing for cost reasons has become a trend in business.

In order for insourcing to be judged as beneficial to a corporation in terms of costs, strategic and sustainment positioning, it must first be measured. In order for a metric to be developed it will need a framework. In order for a framework to be developed, it first needs a taxonomy. The purpose of this paper; therefore, is to develop a taxonomy through a literature review. This taxonomy is then compared to a recent Business Case Analysis (BCA) for similarities, differences, and additions to the taxonomy. From this step future research can develop a metric to measure the benefits of insourcing versus outsourcing for both private and government uses.

1.2 Problem Statement

The executive and legislative branches agree that there has been too much outsourcing in the past. The best option is a combination of insourcing and outsourcing which has traditionally been the way the government has conducted business. Ultimately the question is what conditions and processes are best for insourcing and which conditions and processes are best for outsourcing. OMB circulars and GAO reports provide general guidelines for such decision making but nothing truly definitive. Current literature develops a framework for certain aspects of the process, but no framework for the entire process. The purpose of this paper is to develop a taxonomy so that a decision framework can be developed that considers the optimal solution for the long term

financial gain, corporate strategy, and continued sustainment of the corporation in the insource/outsource decision process.

1.3 Assumptions

The corporation in this paper is assumed to have already been established in the industry and desires to remain in business for the long term. The project or production process has already been started and is now in the operations and maintenance or sustainment phase. The production process includes goods or services or both. There will be suppliers for the needs of the process in insourcing. These assumptions are pointed out because the path taken would be different if the project or corporation was in the design or planning phase. The decision to outsource or insource is ideal and the most advantage is gained if such decision is planned in the earliest of the lifecycle phase. However, even then, not every contingency can be known or predicted.

1.4 Overarching Goals

A corporation must ask itself where it wants to be in the future. Does it want to still be in business years from now or just survive long enough to make a big profit then fold? These are difficult questions that stakeholders must ask themselves but only an honest answer can optimally achieve the desired outcome without wasting precious resources. If a corporation wants to be in business for the long term, how can it maintain a reasonable level of good product and service, yet still maintain long term financial gain, achieve corporate strategy, and have continued sustainment of the corporation?

Chapter 2

Literature Review

The extant literature on the make or buy decision is on outsourcing; as that has been a common business practice in the past few years. The literature shows that there are several factors involved in making outsourcing decisions that affect the bottom line. These other factors are often ignored and managers have focused on cost alone. The cost was generally calculated using standard accounting practices, thought of as traditional cost (Sanders, Locke, Moore, and Autry 2007). This use of cost and accounting affects short term financial gain and does not consider corporate strategy, long term sustainment of the corporation, costs across departmental functions within the organization, or costs across the supply chain.

This paper develops a taxonomy from the current literature to show what must be considered in the insourcing decision making process. Insourcing is referred to as an "activity, product, or service previously bought from an outside source that will be brought in house, the previous buy decision is reversed" (Leenders, et. al. 2006: p. 476).

The literature reviewed here revealed that most factors can be classified into six general categories. They are cost, corporate culture and economic environment, knowledge, laws and regulations, relationships, and metrics. Within these categories are the individual caveats specific to that category. Throughout these categories and caveats are interwoven factors of time, trust, common goals, and cash flow. On the surface these six categories seem to be easily met for successful insourcing. However research has shown that there are some very important details that go along with these six simple

categories that may or may not make insourcing the optimal solution for the long term financial gain, corporate strategy, or continued sustainment of the corporation.

2.1 Cost

When considering cost, what is usually brought to mind are costs calculated with the traditional accounting method. Traditional ways of calculating cost are variable and fixed costs such as labor, production, utilities, cost of equipment, taxes, and so on. What these traditional costs consider is the cost per unit over the short term according to Sanders, Locke, Moore, and Autry (2007). True cost is not factored into the decision because it is more long term and strategic in nature. The reason traditional costs are the only or main factor considered in these decisions are for simplicity in the decision making process. True costs would include the services involved as well as the particular good that was outsourced and the associated tangible and intangible costs. Oftentimes these true costs are difficult to calculate due to the intangible factors (Sanders, Locke, Moore, and Autry 2007). An example of an intangible cost is the perception of success which is discussed in the next section. Also the ways to calculate true cost for a service is different than that for a good (Savas 1987). Cost across the supply chain must be considered as well. When work is outsourced or insourced without understanding how these true costs affect the bottom line it can lead to a decision that is not in the long term best interest of the corporation.

Research shows that outsourcing without regard to these true costs can be an indicator of the financial health of the company (Sanders, Locke, Moore, and Autry, 2007). This was also found in the information technology (IT) industry. Firms that outsource their IT on. a large scale are already "in poor financial situations" (Hirschheim and Lacity 2000 p.

100). Managers must stress that outsourcing is not the way to increase the bottom line when pressured to outsource based on traditional cost.

2.1.1 Economic Value Added (EVA) and Earned Value Management (EVM)

There are methods other than traditional accounting approaches used in industry to calculate cost. One method is the EVA technique developed by G. Bennett Stewart (1991). Another method used by the defense and aerospace industry is the EVM system. These methods take into consideration things that may affect cost that are not readily apparent and may not necessarily show up on the traditional balance sheet.

EVA calculates cost of the capitol used in creating a product in addition to the traditional accounting cost. This is then subtracted from the profit to give a more accurate read on cost (Lambert 2008 p. 19).

EVM, according to the Defense Acquisition University (DAU) Acquipedia, states this model is used to "achieve cost, schedule, and technical performance objectives" (page 1). In other words, for the money that has been spent on a project, does the work already completed meet the technical requirements at that stage of development in that point in time. A memorandum from Director of Defense Procurement, Shay Assad, states that for DoD contracts EVM requirements were not found in, and or were inconsistent. A weakness wikipedia points out in EVM is that it only determines if the project is on schedule given the cost, but it does not tell the quality of the product being produced.

Neither EVA nor EVM alone can be used to determine if insourcing is in the best interest of the corporation, especially if they are difficult to implement or not implemented at all. Another cost counting tool that is used in industry is the performance based logistics (PBL) agreement.

2.1.2 PBL

A way to counteract the gaps in the various methods of calculating costs is something called the PBL agreement. The PBL has become popular with government contracts in the aerospace industry. It has long been known to firms that parts and service after the sale can be a significant portion of the overall firm profitability (Kim, Cohen, and Netessine 2007). A PBL contract is one where the supplier provides a good or a service based on the outcome. A PBL agreement is supposed to be a strategy for maintaining the performance of a system or product. These are used mostly in the defense industry in providing operations and maintenance support of a weapons system. The goal is the outcome, meaning an aircraft is fully mission capable at a predetermined rate. It is not necessarily about the purchase of spare parts, but that is often included in the agreement. For example one may purchase an extended warranty for an automobile that includes regular oil changes, filters, and oil. It is really not the oil changes, filters, and oil you want, but an automobile that runs well when you need it too. This way you are not responsible for a separate purchase of filters and oil, and paying someone to change the oil.

The PBL agreement is supposed to decrease cost for the purchaser over the long term and at all forward and backward points along the supply chain. It does this by providing a steady income from the purchaser to the Original Equipment Manufacturer (OEM) and from the OEM to the OEM's suppliers as well. Since it is a long term agreement the OEM and their suppliers are thus encouraged to invest in equipment and processes that will streamline their production systems thus increasing efficiency and decreasing costs.

These savings are supposed to be passed on to their immediate customer and their customer's customer along the supply chain.

Randall, Pohlen, and Hanna (2010) have found that upstream suppliers use PBLs to their own advantage by increasing their own profitability and not the general overall profitability of the supply chain. This could possibly affect overall outsourcing costs, and make insourcing a better option. An upstream supplier has no incentive to decrease their cost to a manufacturer that has a PBL contract with another manufacturer or government. The upstream supplier does not have a guarantee or contract that they will be that manufacturer's supplier over the long term. If that upstream supplier is a sole source and there is no partnership relationship, there is even less incentive for that supplier to decrease cost.

Randall, Pohlen, and Hanna (2010) have developed a framework for the PBL to understand "how processes spanning multiple trading partners can be effectively aligned by performance based outcomes at the end-user level" (p. 36). Now that there is a framework, a metric can be developed that can be used in developing a way to measure the true cost of the PBL to a corporation that is using this cost method in their outsourcing considerations.

It is suggested here that the results of traditional costs, EVA, EVM, and PBL must be taken in context with other cost considerations. Furthermore cost and its various aspects must be taken in context with the other five categories and caveats in the insourcing decision process. These in turn must be considered in determining where the corporation is at and where it wants to be in its overall long term financial goals, strategic plan, and sustainment of its business life.

2.2 Corporate Culture and Economic Environment

Another major category the research revealed that can influence the success or failure of the insourcing decision is the corporate culture and economic environment. When considering insourcing the corporate culture and economic environment the corporation exists in must be taken into consideration.

2.2.1 Antecedents, Corporate Internal History and the Project Manager

Current corporate culture and the economic environment of a particular industry is the result of a culmination of all its antecedents (Randall, Pohlen, Hanna 2010 and Vargo and Lusch 2004). This would include the experiences the corporation has had in that industry with insourcing/outsourcing as well as the general overall experience with the particular item they are producing and selling. A program manager must consider these factors when deciding to insource. Since insourcing is reversing a buy decision, it can be assumed at some point the corporation had created this good or performed that service and later outsourced it. A program manager that has been on a project for a long time can readily remember why that part of the production process was outsourced in the first place. If those reasons are no longer valid, then insourcing should be considered as a viable option. This is part of corporate knowledge which is oftentimes silent and is detailed later under the knowledge section.

2.2.2 Competition and the Economic Environment

Savas (1987) states that outsourcing works well "when there is competition, there are several contractors available to do the work and the competition among them can be sustained" (page 109). In the United States and European Union there are only five aircraft manufacturers: Lockheed Martin, Boeing, Bombardier, Airbus, and Embraer.

With so few manufacturers competitive conditions really do not exist anymore in either the US or Europe according to Pritchard and MacPherson (2007). Milward and Provan (2000) echo the sentiments of decreasing competition and the economic environment it creates, especially where government contracts are concerned. In an industry with an already declining number of firms, a government awarded contract does "not encourage competition in the market place but competition for the market" (p. 366). Given this situation in the economic environment competition cannot be sustained.

2.2.3 Perception of success

Corporate culture is also influenced by the perception of successful outsourcing by different stakeholders within the corporation according to Hirschheim and Lacity (2000). They used as case studies information technology that was outsourced by fourteen firms. There were three stakeholder groups within each corporation; senior management, the IT management, and the user. Each group had very different needs and perceptions of what successful outsourcing was. As a result it was impossible to get those goals within the corporation to align due to those perceptions and the underlying office politics.

The senior managements' goal was to cut costs, costs were judged using traditional accounting methods, and allow IT management to compete for their job, like an outsourcing agent would. Thus the IT management had to cut their costs. Senior management viewed IT services as a business commodity and cost were to be cut without thinking about the quality of service involved. The IT management had to balance cost cutting with service. If given the authority to cut costs, they still sometimes could not due to company politics. If they did cut costs, service was sometimes compromised. Finally the user of the service had their own perceptions of success. Their perceptions

were how well the service met their needs and how closely it was tailored to those needs Hirschheim and Lacity (2000).

Interestingly the conclusion by all stakeholders was that actual cost savings for outsourcing irrelevant. What was relevant was the perception of whether or not the outsourcing was successful. In this case insourcing would certainly have been better as it would have been perceived as being better. Furthermore since there was no alignment of goals and perceptions within the firm, the outsourced contract was itself a hassle to monitor. Perception is an intangible factor that certainly affects cost. In this case upper management perceived that by outsourcing the IT function they were cutting cost. In reality, the outsourced function was not being tailored to the needs of the end user as well as costing more time and money to monitor the outsourced contract.

Understanding the underlying corporate culture, economic environment as well as the antecedents and corporate internal history that created it are critical for successful outsourcing or insourcing decisions and the perception of success. The project manager plays an important role in having the corporate memory of such events and why certain decisions were made in the first place. A broader category of corporate memory is another important category in the make or buy decision; knowledge.

2.3 Knowledge

Retzig and Wagner (2010) state that knowledge loss comes in two forms; learning and forgetting. Learning is simply the mechanism by which a corporation acquires knowledge. A corporation may not invest in the capital equipment needed to do the job more efficiently, therefore; learning from experience with that equipment and decision process involved with its use, purchase, and maintenance cannot take place. What affects

the corporation's final product or core competency the most is forgetting what is involved in the process because it has been outsourced and no one at the corporation remembers how it was made. In this case the corporation loses touch with the knowledge of how that outsourced part of that product is made. Advances or changes in the technology involved with this product are not maintained. It may not be realized how these technological changes can improve the product or lack of implementation may harm the corporation's competitiveness until much later.

2.3.1. Core competency, technology, technology shocks, and tacit knowledge

Sanders, Locke, Moore, and Autry (2007) found that managers in corporations that are looking to outsource part of their production process may not completely understand that process. They may not understand how that process supports or may even be their core competency. Core competency is best defined by Prahalad and Hamel (1990 p. 82):

> "Core competencies are the collective learning in the organization, especially how to coordinate diverse production skills and integrate multiple streams of technologies…it is communication, involvement, and a deep commitment to working across organizational boundaries…it does not diminish with use…it must be nurtured and protected, knowledge fades if it is not used."

For an already established process outsourcing may not be the optimal solution for long term success. According to Retzig and Wagner (2010) there is a loss of knowledge that leads to hidden (intangible) costs to outsourcing that may not be readily apparent until the product is downstream. These knowledge losses lead to a deterioration of a company's core competency. This negates one of the main purposes for some outsourcing, which is to allow a corporation to focus on its core competency. Lambertini

(2010) goes so far as to say that a company may no longer even be able to build its core competency product as the knowledge simply isn't there any longer.

Brusoni, Prencipe, and Pavitt (2001) agree stating that when upstream activities are outsourced the downstream activities may affect the core competency of that corporation. Jacobides and Billinger (2006) concur stating that a downstream product may be improved when an outsourced upstream activity is incorporated back into the system. Thus loss of knowledge could lead to loss of performance. Without this process knowledge optimal solutions for the long term financial gain, corporate strategy, and continued sustainment of the corporation cannot be put in practice.

Research done by Lambertini (2010) suggests that this is especially true for any outsourcing. He found that outsourcing does undermine the "long-run technological capabilities of a firm" (p. 109). Lambertini refers to two types of "shocks" to the supply chain system that could contradict this model. The first shock is a demand shock where demand is increased. In this case insourcing is more profitable because the corporation is better able to handle the increased demand or surge as was seen in the example in the introduction of this paper. The second shock refers to a huge change or leap in the current technology. When the change is small it is still better to insource. However when there is a huge shock, it is better to take advantage of the research and development of other corporations and outsource to them. When a technological capability is so far advanced from what a firm currently does or needs, only then does outsourcing that knowledge not affect its own capabilities because it was simply not there or not close to that technology leap in the first place (Lambertini 2010).

Contradicting this somewhat is Prahalad and Hamel's (1990) finding that "when fundamental technologies change…that company's product line, along with all of its investments in marketing and distribution could be vulnerable" (p. 84). This would suggest that some knowledge about evolving technologies must be followed closely. Brunsoni, Prencipe, and Pavitt (2001) state that when firms outsource whether it is a component piece (good) or the knowledge (service) for the technology needed, they must retain more knowledge or technical capability than they need or order to manage the interdependencies of the various suppliers of components and knowledge.

So much of knowledge is tacit due to its very nature, and is "embodied in the people and the organizational routines" Brunsoni, Prencipe, and Pavitt (2001 p. 599 and Prahalad and Hamel 1990). This type of knowledge can be difficult to transfer. Sometimes this knowledge is quite simple, but can make a huge difference. For example a personal care product was being produced at a pilot facility. Contractors were brought to manage the equipment and put the lids on the jars. For some reason after the product was put in the jars, the lids would not fit on the jars. The vendor of the jars insisted that the lids and jars did fit together and were made to do so. Since most of this process was contracted out to contractors, no one there had the experience or scientific expertise to realize what was happening. The product was coming out of the machine still warm, thus warming up the jars. This mild warmth caused the jars to expand ever so slightly, causing the lids not to fit. This knowledge was silent and there was no one there with the "memory" or expertise to realize this. As a result a lot of resources were wasted trying to determine why the lids would not fit and searching for a new container vendor.

2.3.2 Technical knowledge and Loss of Performance

There is a further consequence of loss of knowledge. In order to decrease ambiguity in an outsourced product, oftentimes technical knowledge must be given to the supplier from the manufacturer. According to Pritchard and MacPherson (2007) this is especially true in aircraft manufacturing. Rarely are things built to print anymore. In order to accommodate the risk sharing agreements tacit scientific and technical knowledge must be shared as well as the equipment. This is knowledge that the manufacturer may have spent years developing and perfecting and at some point was considered proprietary. This technical knowledge is made public to the first and second tier suppliers. Pritchard and MacPherson (2007) define this as "strategic destruction in that short term financial gain is sacrificed at the cost of losing the knowledge-based value of the company over the long term" (p. 328).

Lockheed Martin, Boeing, Bombardier, Airbus, and Embraer aircraft manufacturers are outsourcing more and more of their manufacturing capabilities in order to secure agreements in selling those aircraft abroad. Boeing has outsourced some of the manufacture of its 747s to China in order to sell to China some of those 747s. This also reduces the amount of its own money the aircraft manufacturer has to spend on making a new aircraft (Pritchard and MacPherson 2007).

What Prichard and MacPherson (2007) see happening is that aircraft manufacturers will have to give their technical knowledge to the supplier in order for that supplier to build that part. This technical knowledge may have been something that the manufacturer has spent decades trying to mature. The supplier will then take that technology and become a competitor instead of a supplier. Prahalad and Hamel (1990)

echo these sentiments stating that, “if a supplier decided to enter the market directly and become a competitor, that company’s product line, along with all of its investments in marketing and distribution, could be vulnerable” (p. 84).

Pritchard and MacPherson (2007) cite as an example a possibility of this happening to Boeing in Japan. Composite technology developed in the 1980s was used in manufacturing the wing of the 787. As of 2007 the Mitsubishi company was hired to build the composite wing. They were given the technology to do this by Boeing. With this information the Japanese aerospace industry now has the capability to build an all composite wing. Those companies can now take that technology and build their own regional commercial aircraft.

This has come to pass according to a June 2010 Bloomberg report by Chris Cooper and Kiyotaka Matsuda. Mitsubishi Aircraft is making 78- and 92-seat Mitsubishi Regional Jet plane with plans to start production later this year with the financial backing of the Japanese government. The first one is to be delivered to the customer in 2014. Aircraft President Hideo Egawa expects 40% of the sales of these aircraft to be to North America according to Francis (2010).

2.3.3 Architecture

Randall, Pohlen, and Hanna (2010) suggest that an architectural framework must be set up in such a way that there is unimpeded communication flow throughout the supply chain. It is through communication that knowledge is shared throughout the supply chain. The implication here is that the company used for outsourcing is now a part of the supply chain and as such a communication architecture is also needed with them. They should be included in the communication network throughout the supply chain.

Knowledge is transmitted through communication and if no architecture for it exists in the first place, it cannot take place seamlessly.

In a broader sense Prahalad and Hamel (1990) suggest a strategic architecture be established. This would allow for communication with customers as well as suppliers to give a "broad direction without giving away every step" (p. 89). This strategic communication architecture must be combined with the corporate communication infrastructure to promote long term financial gain, corporate strategy, and continued sustainment of the corporation.

2.3.4 Diminishing Manufacturing Sources and Material Shortages (DMSMS)

Diminishing Manufacturing Sources and Material Shortages (DMSMS) are an increasing concern in the manufacturing industry particularly the aerospace industry in the DoD. DMSMS is the:

> "loss or impeding loss of manufacturers of items or suppliers of items or raw materials which may cause material shortages that endanger a weapon system's or equipment's development, production, or post production support capability." (Korbren, Melnikow, and Robinson 2005 p. 62)

Korbren, Melnikow, and Robinson (2005) recommend taking a proactive approach to plan for a DMSMS situation such as using PBLs among other possibilities. However these proactive approaches do not directly address DMSMS. A manufacturer that has outsourced a component in their process has no control if a supplier should go out of business. To negate this problem, insourcing is a better option.

As manufacturers for certain needed products decrease and parts become obsolete, the knowledge for the product production may be lost at worst or just difficult to reproduce at best. In this case the knowledge of how to produce an item is also linked with who may

produce it. Permission to manufacture those outsourced parts when the corporation does not have data rights is tied to laws, regulations, contracts, and control.

2.4 Laws and Regulations

All private industry is regulated to a certain degree by laws and regulations stipulated by the government. This is certainly true in the aerospace industry, especially for work performed according to the specifications set forth by the DoD. These laws and regulations must govern any outsourcing/insourcing decision.

2.4.1 50/50, Core, and A-76

The main laws concerning the DoD and their relationship to the aerospace industry are the 50/50 and Core laws. The 50/50 law can be found in Section 2466 of Title 10 United States Code. It states that no more than fifty percent of military funding can be spent using private sources for maintenance and repair. Even though guidelines have been issued they are vague and thus monitoring whether or not these compliances are followed is difficult (GAO Report 2000).

Core capabilities are those capabilities that are necessary to the function of the armed forces. These capabilities are so important to the function of the military that they remain government owned, operated, use government personnel, equipment, and facilities (GAO-09-83 2009 p. 9). This same report found there are some gaps in the determining what is actually core to the government and how to return a process back to government control once it is determined to be core.

Combined with these laws is the A-76 Circular recommendations which are written by the OMB (Congressional Research Service 2011). According to the Congressional Research Service these recommendations state that regardless of whether outsourcing is

government or private owned, they must be performed in the most efficient and cost effective manner possible. Yet all of this is vague and gives little direction.

2.4.2 Contracts and Undefined Contract Actions (UCAs)

Generally there are two types of contracts awarded from the government: those for research and development (R&D) and those for items used in production. Within these two broad categories are subtypes. The contracts usually reserved for R&D are cost plus incentive fee (CPIF), cost plus award fee (CPAF), cost plus fixed fee (CPFF), cost or cost sharing (C or CS), and time & materials (T&M). The contracts usually reserved for production are firm fixed price (FFP), fixed price economic price adjustment (FPEPA), fixed price incentive firm target (FPIF), fixed price award fee (FPAF) and fixed price prospective price redetermination (FP3R) (DSMC 2008).

Some contract types are worse than others for research and development situations. The CPFF undermines the incentive for research and development (Lambertini 2010). It also keeps a company from investing in the people, time, and equipment to be more efficient in the process as the CPFF contract does not cover these things. This would include the cost the company must pay out of pocket and in not recoverable on that contract. The corporation does not know if the contract will be extended once the obligations from the prior contract are met. So a corporation will not do more than specified in the contract in order to not diminish profits.

Savas (1987) recommends that in all contracts "appropriate terms must be included in the contract and are enforced" (p. 109). However with R&D, it is ambiguous. The process itself cannot be made specific because there is no precedent for it.

Lafontaine and Slade's (2010) research has found that when a contract does not have an expiration, it can leave both contracting parties vulnerable to exploitation by the other. When the duration is limited to a short time, it allows for flexibility which is good when the flexibility is needed. However, the longer the contract the less flexible it is. Lafontaine and Slade (2010) also found that when a contract is recontracted such as the case with a FP3R "there is a greater scope for opportunism" (p. 593).

Lambertini (2010) suggests some contracting methods to get the most out of outsourcing. Successfully outsourcing contracts are those that set a limit on the initial price, in other words how much you are willing to spend to get this new technology or what your expectations are for the productivity of this new technology. This concurs with Savas (1987) who states that the "work must be specified unambiguously" (p. 109).

Outsourcing is particularly costly when the contract for the work is not complete in order to satisfy the immediate need for the item Lambertini (2010) and Grossman and Hart (1994). A type of contract that satisfies the immediate need for an item often used in the aerospace industry is the Undefinitized Contract Action (UCA). UCAs are contracts that "authorize contractors to begin work before reaching a final agreement on contract terms" (GAO-07-559 2007 page 1). Customarily these contracts are to be resolved within 180 days after issuance and used only rarely. The buyer is protected somewhat in that the only a "cost up to" amount is specified. What was found in the GAO-07-559 report is that contractors usually received up to 50% of the cost up front and have little incentive to settle the contract quickly. The use of such contracts seems to be increasing and are underreported by the various government departments that use them. When contracts are incomplete it is very important to establish which party has

control over what assets in order to determine specific and residual rights (Grossman and Hart 1994).

2.4.3 Control

Grossman and Hart (1994) suggest that rights in a contract are of two types: specific and contractual (p. 692). When specifying the rights and assets to which one party has control over are too lengthy or costly to put in a contract, it may be cheaper to go ahead and purchase them. These are called specific rights and would include things like data rights which grants the owner the right to have someone else manufacturer the part if they so desire. This is a benefit of insourcing. Rights that are not specified are considered residual rights and may or not be beneficial to insourcing. An example presented by Grossman and Hart are the manager's incentives. Should the purchase somehow infringe on the manager's incentives the outcome of the purchase may not be realized. Insourcing is important for control when there are difficulties in "writing or enforcing complete contracts" (Grossman and Hart 1994 p. 692).

Sanders, Locke, Moore and Autry (2007) and Grossman and Hart (1994) state that the loss of control due to outsourcing can create opportunistic behavior. Also the greater the amount of work outsourced the greater the loss of control the buyer has. Regardless of laws, contracts, or control what these agreements actually regulate is the relationship.

2.5 Relationships

Relationships govern all aspects of cost, knowledge, culture, and laws and so must be considered in the outsourcing/insourcing decision. Most literature has focused on

whether the relationship is transactional or more of a partnership. No literature was found on the interpersonal relationships across corporations in business situations.

2.5.1 Transactional Relationships and Partnerships

A transactional relationship is one that is considered short term (Randall, Pohlen, Hanna 2010). The transaction is for a one time purchase such as in a spot market (LaFontaine and Slade 2010). LaFontaine and Slade (2010) also found that most purchases are governed by contracts. Since contracts are by their nature incomplete (Savas 1987), may not have an expiration leaving both parties vulnerable to exploitation by the other, and may not have the needed flexibility; partnerships are sometimes formed (Lafontaine and Slade's 2010).

A partnership is for the longer term and for repeated purchases (Mentzer, Min, and Zacharia 2000). Several key common elements to both parties must be in place for this special relationship to form and be successful. Those elements are drivers, facilitators, components, and outcomes. Drivers are the reasons to partner, such as contracts not being enough. Facilitators are the ease of the relationship between the two parties, how well they get along together. These two elements give the relationship potential. Components are what is actually involved in making the relationship work. The outcome is just that -- the outcome. The outcome has to be satisfactory to both parties for it to continue.(Lambert 2008 pages 21-22).

2.5.2 Conflict management, Competitive Advantage, Strategic, and Operational

In any business relationship there is bound to be conflict and risk (Lambert 2010 and Mentzer, Min, and Zacharia 2000). It can hinder partnering and the benefits it is suppose

to provide when the partnering relationship was formed according to Mentzer, Min, and Zacharia (2000). This is especially true if one party feels taken advantage of by the other, especially if that advantage is for the short term. The partnership is for the long term. If a good communication architecture is in place, conflicts can be managed and the partnership can flourish.

Partnerships are best for competitive advantage. There are two types of partnering according to Mentzer, Min, and Zacharia (2000). They are strategic partnering and operational. Strategic partnering gives each party the advantage in that it allows them to achieve their strategic goals (Sanders, Locke, Moore, and Autry 2007, Mello, Stank, and Esper 2008, and Mentzer, Min, and Zacharia 2000). Operational partnering is more about operational efficiency, meaning ease of every day tasks.

When outsourcing the type of relationship needed must be determined first. In situations where such a close relationship is needed and the elements are not there to form a partnership, it may be better to insource instead of outsource to achieve the desired long term financial gain, corporate strategy, and continued sustainment of the corporation.

2.6 Metrics and Monitoring

Metrics for measuring the success of any program appear to be based on cost alone. However just as cost cannot be the only determinant of the make/buy decision it also cannot be the only indicator of success.

According to Savas (1987) work must be monitored once it is contracted out. Marvel and Marvel (2007) researched service and delivery programs for the elderly and found that when the government keeps something in house it is monitored intensely. The same

is true when it outsourced to a private firm. However when something is outsourced to another government entity or to a non-profit organization, the output is not monitored closely. This concurs with Brown, Potoski, and Van Slyke (2006) which found that while non profits may not behave opportunistically, thus negating the financial need for monitoring, the goals may not be in alignment with those of the contracting firm.

Monitoring has been de-emphasized with outsourcing because of the assumption that the monetary incentive is enough to achieve the desired result from the supplier. A theory postulated by Harris and Raviv (1979) state that when information is incomplete there is risk involved. The incentives, mainly monetary, needed for the supplier to take on this risk undermine risk sharing. This leaves one party sharing more of the risk than the other, thus leaving the less burdened party with an opportunity to shirk their responsibilities. Miller and Whitford (2006) further postulate that even when suppliers are willing to take on the risk, the cost to the corporation may not be covered by the profit. "The incentive must be both efficient and profit maximizing" (pp. 215). Thus there is a limit to how much incentive can induce the supplier to produce. When the corporation can afford such incentives, they may choose not to implement the action because "the corporation can expect to earn a higher residual profit with an inefficient contract" (p. 215).

Items that can be insourced are of two types: goods and services. The metrics for goods must be vastly different from those of a service. Generally the quality of the good produced can be readily assessed and specified in the contract because of the tangible qualities of a good (Vargo and Lusch 2004), thus easily monitored. Services are difficult to monitor because quality cannot be as strictly controlled and typically vary greatly

between service providers. Services are also more difficult to measure simply because it is an "ambiguous concept" (Randall, Pohlen, and Hanna 2010 p. 39, and Brown, Potoski, and Van Slyke 2006). There is variation in the service rendered. Hence there is no standard set to compare to or monitor (Savas 1987 p. 123). Vargo and Lusch (2004) reiterate this by saying these intangible factors are based on "relationships and cocreation of value" (p. 1).

There are also intangible factors of goods. Since these intangible factors are critical to the cocreation of value it is imperative to align the goals of the suppliers in the supply chain. Brown, Potoski, and Van Slyke (2006) state that care must be taken in selecting a vendor in order to achieve this. Milward and Provan (2000) state that private vendors are motivated by profit and may cut expenses when that profit is threatened even when it is not in alignment of government objectives.

Lambert (2008) page 297 suggests a that using profit and loss statements of all the suppliers in the supply chain along with aligning the goals throughout the supply chain will increase network effectiveness for the corporation. One framework for a metric has been developed by Randall, Pohlen, and Hanna (2010) for the PBL process to understand "how processes spanning multiple trading partners can be effectively aligned by performance based outcomes at the end-user level" page 36. PBLs are based on performance and service. Performance can be easily be measured but there are challenges involved in service metrics.

Metrics only measure the good or service they are intended for and even then they have limitations. Metrics and monitoring must be used in context in order to aid in the

long term financial gain, corporate strategy, and continued sustainment of the corporation.

2.7 Interwoven Factors

The literature reviewed in this paper revealed that six general categories need to be considered for the long term financial gain, corporate strategy, and continued sustainment of the corporation. Those categories are cost, corporate culture and economic environment, knowledge, laws and regulations, relationships, and metrics. These categories alone are not enough to make an informed make buy decision. Interwoven throughout these categories are time, trust, common goals, and cash flow which allows for the intraworkings and interworkings of the categories.

2.7.1 Time

Time, its use, and availability are inherent in every category. According to Mentzer, Min, and Zacharia (2000), a decrease in product lifecycle, product availability, and faster product delivery shortens the time needed to produce an item. This allows for meeting customer demand in less time. Generally these companies that are able meet these demands are better at "generating new ideas and incorporating them into innovations" (p. 554) which adds to the sustainability and long term financial gain of a corporation if it is inherent in the corporate strategy.

Time is involved in cost. One of the selling points of the PBL is to deliver the needed capability on time (Randall, Pohlen, and Hanna 2010). Time is also involved in developing knowledge, metrics, and corporate culture. In contracts it has been shown that the longer a contract continues, or if it does not have a set time limit, it can be detrimental to both parties (Sanders, Locke, Moore, and Autry 2007).

2.7.2 Trust

Trust is a key element for any business transaction whether it be long term, strategic, short term, or transactional. Trust links the supplier to the manufacturer and the manufacturer to the customer. There must be trust in the relationships attached to the corporation involved. Trust is an essential element in forming relationships (Mentzer, Min, and Zacharia 2000). Even when appropriate terms can be written in the contract it is not a guarantee. According to Williamson (1971) and Savas (1987) a contract simply cannot cover every contingency. Both parties must have trust in one another that there will be no opportunistic behavior. This would suggest that the most significant element in a contract is one that can not be written in the contract. That element is a trust, Morgan and Hunt (1994).

2.7.3 Common Goals

Lambert (2008) and Mentzer, Min, and Zacharia (2000) state that common goals between corporations must exist before partnering can be successful. Morgan and Hunt (1994) state that "common values contribute to the development of commitment and trust" p. 25, which are inherent in the culture of that corporation. When deciding to outsource the corporations involved must have common goals that will lead to the long term financial gain, corporate strategy, and continued sustainment of both of the corporations.

2.7.4 Cash Flow

Corporations exist to make a profit and must make a profit if they are to be sustained. What corporations must decide is what is better for them; short term financial gain with a high profit but little sustainability and strategy or long term financial gain with a lower

profit, strategy, and sustainability. It is the flow of the money from the income and the outflow of money from the costs that makes production possible in the first place. Traditionally once a good is delivered, the payment isn't received until 30 to 90 days later. So the corporation must be able to exist during that time period without that income. "Financial indicators tend to serve as symptoms of problems, rather than leading to an enduring strategic rationale for outsourcing," Sanders, Locke, Moore and Autry p. 9 (2007).

What is implied throughout though never expressly stated is that time is needed for trust to develop, time is needed to discover if corporations have common goals, and cash flow happens over time. These interwoven factors bind the six categories together that would allow for successful outsourcing. Without the interwoven factors the six categories of cost, relationships, corporate culture, knowledge, laws, and metrics stand alone and on their own do not reveal any true meaning to the make or buy decision process. Lack of any of these interwoven factors will lessen the success or cause failure of the outsourced good or service.

Chapter 3

Methodology

This taxonomy will show the factors that must be considered in the insourcing outsourcing decision making process. A taxonomy is a classification scheme. The best method to achieve this is a qualitative study involving partial grounded theory and case analysis. According to Strauss and Corbin, 1990, a qualitative method involves "research that produces findings not arrived at by means of statistical procedures or other means of quantification" (page 17). Taxonomy development is a qualitative method in that statistical procedures and quantification methods are not used. The methodology used in this study is a combination of two qualitative study methods; grounded theory and case study.

3.1 Grounded Theory

A grounded theory approach was implemented first. Grounded theory takes information and then uses that information to form a theory which is then measured. (Leedy and Ormrod, 2010) It is a reverse of the scientific method in that data is collected first then a hypothesis or theory is generated to explain the data. The data collected here is in the form of an extensive literature review. The literature reviewed here is from current business and logistics journals, government publications, and internet articles.

An example of grounded theory use in data collection from a literature review in is the article by Randall, Pohlen, and Hanna (2010). In this paper 67 articles were reviewed that dealt with service dominant logic and performance based agreements to develop a theoretical framework for performance based agreements.

The data used in a grounded theory approach should bring awareness of the conditions of the situation, strategies for dealing with those conditions, consequences, process and process change over time, and variation. (Strauss and Corbin 1990 page 54). The literature reviewed for this paper brought awareness of the conditions, strategies, and process changes over time that are conducive to successful insourcing. The literature also revealed the potential consequences to a corporation when a make/buy decision is made based on cost and not based in conjunction with the long term financial gain, corporate strategy, and continued sustainment of the corporation.

The data taken from current literature is used in developing a taxonomy for the insourcing/outsourcing decision process. The paper does not develop a metric or measure the data. It is for further research to form a theory, a framework, and a metric to measure the framework. Therefore it is not a complete grounded study in that no metric was developed. A taxonomy is a precursor to a model. Once a model is in place, then a method of measurement can be developed.

3.2 Case Study

The case study method is particularly useful in business research. Since this method requires in depth analysis one to few cases are studied at a time. Research questions affect the method of choice of study and approach (Ellram 1996).

Here the case study method is implemented using an existing Business Case Analysis (BCA). The case study has a particular advantage when searching for the how and why of an event, and "when the focus is on a contemporary phenomenon" (Yin page 1). The BCA in this paper is a case study that determined five different Courses of Action (COA)

for the make/buy decision using a model of various decision factors the writer of the BCA developed.

3.3 Combined Methodology

After the taxonomy is developed it is then compared to this recent BCA to see what similarities and differences were in the taxonomy developed from the literature and the taxonomy used in the BCA. These similarities and differences are then analyzed in chapter 4. This study analyzed 35 articles from business, logistics journals, and government reports for common factors that support long term financial sustainment of a corporation, corporate strategy, and continued sustainment of a corporation.

Chapter 4

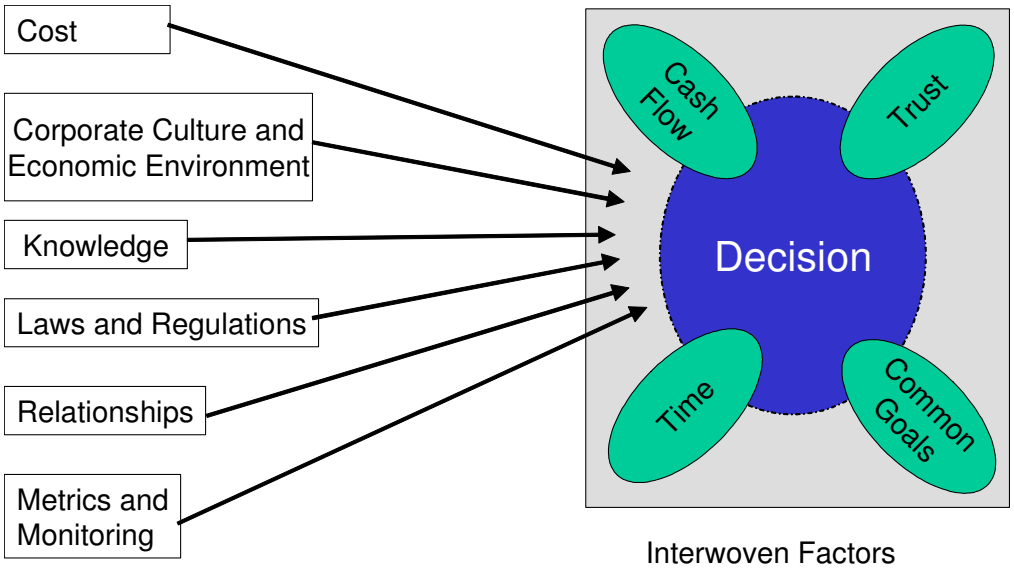
Results and Analysis

4.0 The Taxonomy

The current literature reviewed in developing a taxonomy for the insourcing decision making process revealed that most factors can be classified into six general categories. They are cost, corporate culture and economic environment, knowledge, laws and regulations, relationships, and metrics. Within these categories are individual caveats specific to that category. Throughout these categories and caveats are interwoven factors of time, trust, common goals, and cash flow. The research shows that there are some very important details that go along with these six categories and four interwoven factors that may make outsourcing not the optimal solution for the long term financial gain, corporate strategy, or continued sustainment of the corporation.

The Figure 1 below demonstrates the six categories that must be taken into consideration when insourcing. The interwoven factors are shown flowing into the decision.

Figure 1: Six Categories and Interwoven Factors in the Decision Process



The Table 1 below shows total number of times the reviewed current literature expressed a category.

	Sum of checks
	105
Cost	**11**
Corporate Culture and Economic Environment	**13**
Knowledge	**20**
Laws and Regulations	**25**
Relationships	**10**
Metrics	**15**
Interwoven Factors	**11**

Table 1: Table of Categories and Interwoven Factors

4.1 Cost

Economic Value Added (EVA), Earned Value Management (EVM), and Performance Based Logistics (PBLs) were included in the cost taxonomy because these methods give more detail about total cost other than the traditional accounting methods. EVA calculates the cost of capitol used in creating a product in addition to the traditional accounting cost. This is then subtracted from the profit to give a more accurate read on cost (Lambert, editor 2008 page 19). It was included in the taxonomy because in academic and business circles it is touted as giving the most complete view of total cost.

EVM and PBLs are used most extensively in the DoD and aerospace industry. EVM is the preferred method in tracking cost with regard to level of project completion and schedule. Recently most DoD contracts have had PBLs attached to them. Different methods of calculating costs must be included in the insourcing decision. Futhermore costs must be considered across the supply chain.

4.2 Corporate Culture and Economic Environment

Corporate Culture and Economic Environment were included in the taxonomy because they can greatly influence the success of any decision made by the corporation. If the corporate culture has not had experience with outsourcing, then it will probably not be a successful choice. The culture is determined by its history with the product, the antecedents with the process, and the program manager or management experience. The type of economic environment of that particular industry can influence the success of the outsourcing decision. Is there competition in the market or for the market? The perception of success was included here as well because what may be successful for the management may not necessarily be successful for the end user.

4.3 Knowledge

Knowledge and its various aspects are very important in the make/buy decision process and were included in the taxonomy. Technical and tacit knowledge are so intricately involved in a core competency that once it is outsourced, that knowledge may be lost or forgotten, hence the core competency lost and forgotten. Once that knowledge is gone the corporation may not be able to keep up with the technology changes or technology shocks that can affect their core competency (Lambertini 2010 and Prahalad and Hamel 1990). This may lead to loss of performance in the product. Architecture in terms of communication was placed under the knowledge section because that is how knowledge is transmitted within the corporation and between and among its suppliers and customers. DMSMS is included here as well because knowledge of how the product is made must be retained by the corporation should a supplier no longer be available to the corporation. The level of knowledge the corporation has must be considered in the insourcing decision.

4.4 Laws and Regulations

Every corporation is subject to the laws and regulations of that industry. In the case of the DoD and aerospace industry the main ones are the 50/50 and Core laws. A 76 Circular recommendations are from the executive branch on how these laws should be interpreted. The 50/50 and Core rules are laws that have been passed by Congress and must be followed by the DoD. This taxonomic category also included contracts because they are legally binding documents that define what each party expects from the other. When an item is needed quickly and the expectation and outcome cannot be specified a special type of contract is issued call an Undefinitized Contract Action (UCA).

Government Accounting Office (GAO) reports state that UCA use is on the rise in the DoD (GAO June 2007). UCAs, since they are incomplete contracts, can leave both parties vulnerable to opportunism. Contracts also define specific and residual rights, meaning which party has control over what aspect of production and so was included here. When insourcing the corporation must consider if it can buy out current contracts and manage the laws and regulations associated with that process

4.5 Relationships

The type of relationship the corporation has with a supplier is very important in the insource/outsource decision process and was given a category in the taxonomy. Partnership relationships have been found to be more beneficial than transactional ones for long term outsourcing situations. Partnerships must be competitively advantageous for both parties as well as strategically and operationally compatible. However, according to Fawcett (2011) partnerships fail 50 to 85% of the time. Any relationship will have conflict and mechanisms need to be in place to address it. This must include an architecture for communication (Randall, Pohlen, and Hanna (2010) as mentioned in section 4.3 knowledge.

4.6 Metrics and Monitoring

Once the insource/outsource decision has been made and is in process there must be a metric involved to see if that decision is fulfilling the expectation. Metrics must be specifically tailored to what they are measuring. If they do not, their results have no meaning to the process they are suppose to measure or at worst the results give misleading information in relation to future insourcing decisions. Generally metrics for

goods are vastly different than metrics for services as goods have more tangible qualities than a service. Once the measurement is taken it must be monitored (Savas 1987).

When the government keeps something in house it is monitored intensely (Marvel and Marvel 2007). The same is true when it outsourced to a private firm. However with the increased use of incentives in outsourcing monitoring has been de-emphasized. The assumption is that the monetary incentive is enough to achieve the desired result from the supplier. When information is incomplete there is risk involved. The incentives, mainly monetary, needed for the supplier to take on this risk undermine risk sharing. This leaves one party sharing more of the risk than the other, thus leaving the less burdened party with an opportunity to shirk their responsibilities (Miller and Whitford 2006). It is impossible to have complete information. There will always be risk and always a need for monitoring.

Sometimes the cost to induce a supplier to take such risk may be so great that even when it can be afforded by the corporation, the corporation may choose to keep the process inefficient to increase the profit margin (Miller and Whitford 2006).

4.7 Interwoven factors

Interwoven throughout the six categories of cost, corporate culture and environment, knowledge, laws and regulations, relationships, and metrics and monitoring are time, trust, common goals, and cash flow. They are included in the taxonomy because all are necessary for the workings of the categories and are inherent in either insourcing or outsourcing decision.

4.7.1 Time

Time, its abundance or scarcity, is in all categories. Costs have deadlines for when payment is expected, products have shortened lifecycles, and customers expect their products to be delivered to them in less time than ever. Corporate culture, knowledge, laws and regulations, relationships, and metrics and monitoring develop and evolve over time. Any decision must consider the fluidity of the categories over time.

4.7.2 Trust

Not every contingency can be planned for, even in those cases where all information is known. The unexpected does happen that may affect cost, culture, knowledge, laws, relationships, metrics and monitoring. Corporate culture affects and effects trust between and among their suppliers and customers. Trust is a key element in contracts because contracts in and of themselves are by their nature incomplete (Savas 1987). Both parties must trust that the other will fulfill their obligations and not be opportunistic.

4.7.3 Common Goals

Common goals are necessary for any working relationship. They can be strategic or operational, for the short term or long term. Common goals decrease cost, must align with each corporate culture, complement each others knowledge, be legal, and promote accurate metrics. Goals common to each party are the precursors or drivers to forming long term relationships such as partnering. Partnership relationships are the most advantageous relationships for the corporation and supplier in terms of cost, knowledge, metrics and monitoring. However they do fail more often than not. It has been suggested that a main reason why they fail is lack of common goals between the supplier and corporation.

4.7.4 Cash Flow

Cash flow, not necessarily cost, are important in every category. Cash flow issues usually are symptoms or indicators of problems, not the problem itself. Money problems are rarely solved with more money. When used as a metric or a monitoring method it is not often an accurate measurement. While cash is important in the relationship, it is not the most important factor. It is standard industry practice for a product to be delivered first, then paid for several days later. The supplier should have the cash flow available to take care of business expenses while payment is being made. However the buyer can delay payment long enough which could put the supplier's finances in jeopardy. The supplier can delay delivery until payment is made. The relationship between the supplier and buyer should be such that the supplier is assured of payment within a reasonable period of time. Inflow and outflow of money is usually specified in the contract and thus is under laws and regulations. Cash flow management is influenced by the corporate culture and the knowledge within the corporation on how to do so.

The table below demonstrates the categories, interwoven factors, caveats, and the number of times each was referenced in an article.

		Sum of checks	Retzig and Wagner (2010)	Lambertini (2010)	Pritchard and MacPherson (2007)	Jacobides and Billinger (2006)	Marvel and Marvel (2007)	Brusoni, Prencipe, and Pavitt (2001)	Williamson (1971)	Grossman and Hart (1986)	Brown, Potoski, Van Slyke (2006)	Milward and Provan (2000)	Mello, Stank, and Esper (2008)	LaFontaine and Slade (2010)	Rudy Hirschheim and Mark Lacity (2000)	GAO-07-559 (2000)	Vargo and Lusch (2004)	Randall, Pohlen, and Hanna (2010)	Kim, Cohen, and Netessine (2007)	Gulbrandsen, Sandvik, and Haugland (2009)	Sanders, Locke, Moore, and Autry (2007)	Kobren, Melnikow, and Robinson (2005)	DSMC May 2008 (2008)	Mentzer, Min, and Zacharia (2000)	GAO Report/NSIAD-00-193 (2000)	GAO-09-83 (2009)	Prahalad and Hamel (1990)	Savas (1987)	Defense Outsourcing: The OMB Circular A-76 Policy (2011)	Defense Systems Management College (DSMC) (2008)	Stewart, G. Bennett (1991)	Lambert, Douglas M. editor (2008)	DAU Acquipedia (2011)	US Code Title 10 (2011)	Robert M. Morgan and Shelby Hunt (1994)	Miller and Whitford (2006)	Harris and Raviv (1979)
Cost		11													X			X	X		X														
	EVA																													X	X					
	EVM																															X				
	PBL																	X	X																	
Corporate Culture and Economic Environment		13																																		
	Antecedents																X	X																		
	Internal History																X	X																		
	Program Manager																X	X																		
	Competition				X						X			X																						
	Economic Environment				X							X																								
	Few Buyers and Sellers													X																						
	Perception of Success														X																					
Knowledge		20																																		
	Loss of Knowledge				X																X						X									
	Core Competency					X		X								X											X									
	Technology Shocks		X	X				X																			X									
	Tacit Knowledge							X																			X									
	Loss of Performance		X					X																												
	Technical Knowledge				X																						X									
	Architecture							X																			X									
	DMSMS																					X														
Laws and Regulations		25																																		
	Contracts			X										X									X						X							
	Contracts: Cost Plus Fixed Fee			X										X															X							
	Appropriate Terms are Included in the Contract Document and Enforced								X	X																		X								
	UCAs			X						X						X																				
	Redetermination and Long Term Contracts													X																						
	Title 10 50/50 Law																								X								X			
	Core Capability																									X										
	Circular A 76																											X								
	Control									X				X							X															
	Residual and Specific Rights									X																										
	Work is Specified Unambiguously		X								X																	X								

Table 2: Table of Categories, Interwoven Factors, Caveats, and Supporting Articles

		Sum of checks	Retzig and Wagner (2010)	Lambertini (2010)	Pritchard and MacPherson (2007)	Jacobides and Billinger (2006)	Marvel and Marvel (2007)	Brusoni, Prencipe, and Pavitt (2001)	Williamson (1971)	Grossman and Hart (1986)	Brown, Potoski, Van Slyke (2006)	Milward and Provan (2000)	Mello, Stank, and Esper (2008)	LaFontaine and Slade (2010)	Rudy Hirschheim and Mark Lacity (2000)	GAO-07-559 (2000)	Vargo and Lusch (2004)	Randall, Pohlen, and Hanna (2010)	Kim, Cohen, and Netessine (2007)	Gulbrandsen, Sandvik, and Haugland (2009)	Sanders, Locke, Moore, and Autry (2007)	Kobren, Melnikow, and Robinson (2005)	DSMC May 2008 (2008)	Mentzer, Min, and Zacharia (2000)	GAO Report/NSIAD-00-193 (2000)	GAO-09-83 (2009)	Prahalad and Hamel (1990)	Savas (1987)	Defense Outsourcing: The OMB Circular A-76 Policy (2011)	Defense Systems Management College (DSMC) (2008)	Stewart, G. Bennett (1991)	Lambert, Douglas M. editor (2008)	DAU Acquipedia (2011)	US Code Title 10 (2011)	Robert M. Morgan and Shelby Hunt (1994)	Miller and Whitford (2006)	Harris and Raviv (1979)
Relationships		10																																		
	Transactional/Spot Markets																	X																		
	Partnerships																							X							X					
	Elements in Partnerships																														X					
	Conflict																							X												
	Competitve Advantage																							X												
	Strategic												X								X			X												
	Operational																							X												
Metrics		15																																		
	Work Can Be Monitored						X	X		X	X																X							X	X
	Good (Tangible)																X										X								
	Service (Intangible)										X						X										X								
	Alignment of Supply Chain Processes, Network Effectiveness, and Goals and Strategies										X	X																			X					
Interwoven Factors		11																																		
	Time																	X			X			X												
	Trust								X															X				X						X		
	Common Goals																							X							X			X		
	Cash Flow																				X															

Table 2: Table of Categories, Interwoven Factors, Caveats, and Supporting Articles (Continued)

4.8 A Case Study in Applying the Insourcing Taxonomy

This taxonomy research was compared to a recent Business Case Analysis (BCA) to demonstrate the application of such a taxonomy in the business practice of determining the insourcing courses of action (COA) as well as to add to the taxonomy. Direct quotes from this BCA are in quotation marks; however, page numbers are not directly cited to maintain the confidentiality of the BCA document.

The BCA developed four evaluation factors to use in determining five insourcing/outsourcing COAs. They are financial evaluation, product support performance, sufficient government insight and oversight, and enterprise sustainment fit. These are analogous to the six general categories in this paper. The BCA's evaluation factors sometimes overlap the six categories of this taxonomy.

The cost category from the taxonomy is compared to the financial evaluation factor. Financial evaluation is defined in the BCA as, "lifecycle cost estimates for each alternative based on proposed scope of work."

Five categories of the taxonomy, knowledge, laws and regulations, relationships, metrics and monitoring categories can be found throughout the product support performance evaluation factor. Product support performance is defined in the BCA as, "metrics and qualitative factors for each product support process which are leading indicators of weapon system performance."

Knowledge, laws and regulations, relationships, and metrics and monitoring from the taxonomy can be found throughout the sufficient government insight and oversight evaluation factor. Sufficient government insight and oversight in the BCA is defined as,

"opportunities and access for improved government insight and control enabled by each alternative."

Cost, knowledge, laws and regulations, relationships, and metrics and monitoring from the taxonomy can be found throughout the enterprise sustainment fit evaluation factor. Enterprise sustainment fit is defined in the BCA as, "alignment of each alternative to documented and emerging Air Force guidance and direction."

The BCA developed four evaluation criteria and attributes to use within each of their four evaluation factors. They are knowledge, capability, effectiveness, and IT tools and procedures. These are comparative to the caveats within the categories of this paper. These evaluation criteria and attributes overlap the six categories as well. The evaluation criteria and attributes sometimes contain the caveats in the taxonomy and sometimes not. This is explained further in the following sections.

The BCA used their factors and attributes to develop an evaluation model. The BCA then used the evaluation model to determine five alternative COAs for an insouring/outsourcing decision for the corporation. As this study is to develop a taxonomy it stops short of developing a model and ends the comparison at that juncture. The results and analysis here will follow the taxonomy developed.

4.8.1 The BCA and Cost

Cost is considered in all Courses of Action (COAs) proposed by the BCA under the financial evaluation factor. The BCA's financial evaluation did not contain evaluation criteria and attributes. The BCA made an exception in the financial evaluation. The financial evaluation is based on "lifecycle cost estimates for each alternative based on proposed scope of work." The BCA developed a model from this which contained

current state baseline data, alternative specific analysis, cost model analysis, and financial analysis and summary. There was no specific mention of EVA and EVM; however PBL agreements were referenced many times. PBLs were not used in the BCA financial model as "the only significant reductions in costs appear to be due to changes in scope or requirements instead of efficiency as would be expected in a PBL."

Randall, Pohlen, and Hanna (2010) suggest upstream suppliers can use the PBL to their own advantage to increase their own profitability and not the general overall profitability of the supply chain. This defeats one of the purposes and assumptions of the PBL; that cost is reduced if efficiency increases. The BCA needs to do further analysis to determine if there were any cost increases in any of the PBLs used. If so, was it due to opportunistic behavior of the upstream supplier?

EVMs are mainly used during the production process to see if production is on schedule given the cost at that point in time in the process. It does not indicate the quality of the product being produced.

__EVAs calculate the cost of the capitol used in production. The BCA used another method to calculate cost called Net Present Value (NPV) and Return on Investment (ROI); therefore, a direct comparison was not possible.

In summary there are different ways of calculating cost. The BCA calculated cost using NPV and ROI. The taxonomy used EVM and EVA. Both used PBLs. The taxonomy and BCA both used different methods when considering lifecycle costs. The BCA and taxonomy were both accurate in capturing cost. The method to use would depend on what is being measured. The EVA is more specific calculation to a specific process, whereas the NPV and ROI are more general.

4.8.2 The BCA and Corporate Culture and Economic Environment

Antecedents were discussed throughout the five suggested COAs in terms of what action has been performed by whom in the past. The recommended COA of the five COAs in this BCA is the "derived alternative." The derived alternative recommends that the engineering function remain outsourced as there was never that expertise in the corporation in the first place. This concurs with the research findings. If the corporation has a history of insourcing that product then perhaps it should be remain so and vice versa. However what was not considered in the BCA is how the corporation will manage this function if it has no knowledge of it. This situation is further discussed in section 4.8.3 The BCA and Knowledge.

The effects of the economic environment of the industry were not considered in the BCA and neither was the corporate culture as the taxonomy described it. Competition is mentioned in the "derived alternative" of the BCA. "The derived alternative is able to reduce single source price risk because it introduces competition to the contractors for product support services." Competition in the BCA refers to providing support services. Competition in regards to whom or what is controlling the market is not considered as it is in the taxonomy. If the market is controlled by one company there in no competition; therefore, outsourcing cannot give the corporation long term financial sustainment, strategic advantage, or long term sustainment.

Perception of success is not reflected in this BCA and was beyond the scope of the BCA. Perceptions of success are more of an organizational management and behavior issue than a BCA issue. However, its effect on the success of insourcing cannot be minimized.

In summary both the BCA and taxonomy used antecedents. Competition was mentioned in both; however, there were two different interpretations of it. The taxonomy takes a market view of competition whereas the BCA is specific to a process. The BCA should have considered the how control of the market place can affect the long term financial considerations and sustainment of the corporation. Perception was not mentioned in the BCA, but according to the taxonomy it can affect the success or failure of the outsourcing decision and should be considered

4.8.3 The BCA and Knowledge

Knowledge is mentioned throughout the BCA and in all 5 suggested COAs. The "derived alternative" recommends the engineering function continue to be contracted out as "all engineering support is left with the contractors, as they have distinctive knowledge and capability in this area." Knowledge in the BCA alludes to the technology shocks mentioned in the current literature. The BCA concluded that outsourcing the engineering function is better in order to take advantage of huge leaps in technology that another corporation may have. This concurs with the current literature. However what is not considered in the BCA is the effect of the loss of knowledge, or in this case lack of such knowledge and how it will effect the corporation's ability to manage it.

The BCA did not consider Information Technology (IT) upgrades. However IT upgrades must be considered in any insourcing decision. Moore's law states that computing power doubles every 18 months. This is the basis for the technology shocks mentioned earlier. How will these upgrades be integrated into the system or are they not going to be upgraded at all? If they are not to be upgraded, how will this "old"

technology be sustained, maintained, and made secure? With the use of old technology comes the risk of DMSMS.

There is also no mention of the value of tacit knowledge to the corporation. Technical and tacit knowledge are so intricately involved in a core competency that once it is outsourced, that knowledge may be lost or forgotten, hence the core competency lost and forgotten. This kind of knowledge is embodied in the people of the corporation. When something is outsourced the people as well as the equipment have to leave that corporation. Once that knowledge is gone the corporation may not be able to keep up with the technology changes or technology shocks that can affect their core competency. Corporations must know more than they make. A corporation cannot retain this knowledge if its subject matter experts are employed elsewhere. If the corporation has no true knowledge of the engineering function, how can the corporation manage that function? How will configuration management be utilized to accommodate other new technologies for the system? This loss will eventually lead to the inability to make the product, maintain its quality, or its performance. This should be a key concern for the corporation as lack of knowledge of the engineering function could leave the corporation vulnerable.

Loss of performance is mentioned in terms of performance levels throughout the BCA in terms of risk and cost. Each COA weights these in regard to each other. Loss of performance in this taxonomy is in regard to the loss of knowledge, meaning that knowledge of a process must be retained by a corporation in order for that corporation to manage it and maintain product performance levels. As Brusoni, Prencipe, and Pavit (2001) state firms must know more than they make. This loss will eventually lead to the

inability to make the product, maintain its quality, or its performance which in turn is detrimental to long term financial goals, corporate strategy, and continued sustainment of the corporation.

Architecture in terms of communication is mentioned for government organizations and stakeholders in the BCA. This architecture would appear to allow for communication both ways. The BCA did not include all levels of suppliers in this architecture.

DMSMS is not specifically mentioned in the BCA. The concern for DMSMS is the ability of the corporation to procure the item elsewhere should a supplier source no longer exist. Data rights for items unique to a process allow the corporation to procure those needed items from other suppliers. If a corporation has insourced this process, the DMSMS issue no longer exists. The BCA was written with the assumption that the data rights are owned by the corporation. Therefore DMSMS and data rights were not considered an issue in this BCA. This is further discussed in section 4.8.4 The BCA and laws and regulations.

In sum, the BCA recommends that the currently outsourced engineering function that the corporation has never insourced remain outsourced which concurs with the taxonomy. This also alludes to taking advantage of the technology shocks mentioned in the taxonomy. However the taxonomy also states that when knowledge of these technology shocks and lack of understanding of the process are not understood by the corporation; the corporation then becomes vulnerable. The BCA needs to include a vulnerability assessment in this regard. Both mention a communication architecture, but the BCA only mentions it within the corporation, not with suppliers. The BCA needs to include an

assessment on the communication architecture among suppliers and the corporation. DMSMS and data rights are a concern for an outsourced process. This is further discussed in 4.8.4 The BCA and laws and regulations.

4.8.4 The BCA and Laws and Regulations

Contracts are throughout the BCA and discussed where appropriate. Interestingly the BCA found Cost Plus Fixed Fee (CPFF) contracts are used for sustainment. The literature indicates that CPFF is used for research and development purposes but also undermines incentive in research and development. It is unusual that a CPFF contract was used for sustainment. The BCA found that the incentive to control cost in the CPFF is not there for sustainment which is the same conclusion found when it is used for research and development (Lambertini 2010).

Firm Fixed Price (FFP) contracts are used for production. The BCA also found that a FFP contract provided incentive to the supplier to reduce cost in production. The literature review and BCA also found that the greater the amount of work outsourced the greater the loss of control. The COAs suggested by the BCA contained varying levels of outsourced work and thus varying levels of control. There were no direct contract type recommendations.

UCAs were not mentioned in the BCA so it is unknown to what extent their use was by the corporation or their affect on cost. Recent Government Accounting Office (GAO) reports state that UCA use is on the rise in the DoD. UCAs, since they are incomplete contracts, can leave both parties vulnerable to opportunism and it is oftentimes unclear as to who has control of what. The extent of their current and future use needs to be determined to get a complete picture of the lifecycle cost.

The corporation and the BCA agreed that the corporation either owns the data rights, could acquire them easily, and that prior contracts give the corporation the option of purchasing data rights. The BCA was then written with that assumption. Suppliers argue the point and insist that they own the data rights. Ownership of data rights is necessary should the current supplier be unable to fulfill the demand and an alternative supplier is needed. The implication is that acquisition of these data rights could cost more than the corporation realizes. The cost to purchase these data rights will increase if there is a sense of urgency in finding an alternative supplier.

Core and 50/50 laws were addressed in all COAs. There was no mention of using appropriate terms, enforcement, and work specification. Given that this is a BCA of the current sustainment process, these may have been considered to have already been covered before the sustainment phase. The A 76 Circular was not addressed. These are recommendations from the executive branch not laws.

In summary, the taxomony and the BCA both mentioned Core and 50/50 laws which are a necessary consideration in any DoD and aerospace industry study. The A 76 circular was not addressed as they are recommendations not laws and are currently in a state of evolution. However they give guidance on what is expected in any insourcing decision and should be addressed. More attention by the BCA should have been given to the types of contracts that are in place and why those types were used in the first place. It is unusual that a CPFF contract was used for sustainment especially as it undermines incentive. They BCA should have noted whether or not UCAs were used and if so to what extent and potential cost. The data rights and DMSMS issue if it is not resolved with the supplier may be more costly than either the BCA or the corporation realized.

Acquisition of data rights could limit any cost benefits of insourcing. Appropriate terms, enforcement, and work specification in a contract were not covered in the BCA and were perhaps beyond the scope of the BCA. Regardless of what decision is made appropriate terms, enforcement, and work specification must be considered and included in a contract.

4.8.5 The BCA and Relationships

Relationships are mentioned throughout the BCA. There was no distinction between transactional and partnership relationships. The BCA alludes to relationships suggesting that the corporation could procure materials at the same cost as the supplier should the corporation choose to insource. The BCA further states that "none of the contractors could substantiate and/or quantify their capabilities to reduce costs through scale, supplier relationships, process improvement, etc." Supplier information and their relationship with their suppliers give the contractor a competitive advantage so it is reasonable to expect that this information would not be freely shared for the BCA. Here the BCA is suggesting that the current suppliers do not have partnership type relationships with their suppliers; therefore, cannot use such a relationship to reduce their costs and pass such savings on to their customers. A partnership type relationship with a supplier is ideal when PBLs are involved.

No mention was made of conflict management in the BCA. Conflict management is not reflected in this BCA and was probably beyond the scope of a sustainment BCA. Conflict management is more of an organizational management and behavior issue than a BCA issue. However, its effect on the success insourcing cannot be minimized. If an

architecture is in place for communication with all suppliers and the corporation, conflict would be minimized.

Strategy is mentioned throughout the BCA. The corporation sponsoring this BCA realized the importance of strategy in the sustainment process, yet it was not fully utilized by the corporation. The COAs suggested by the BCA had varying strategies to use as leverage against the suppliers, but not as a means of placing the corporation in a strategically advantageous position.

Operations were mentioned in the BCA in terms of working aircraft. The taxonomy emphasizes operations in reference to partnering for supplies, meaning that the day to day operations of production in the corporation could be more efficient with a partnering type relationship with suppliers should an insourcing decision be made.

In summary the BCA alludes to but does not mention partnership type relationships with suppliers. No distinction between partnership and transaction relationships are made. Both work for a PBL agreement; however, the complete advantage of the PBL is only realized with a partnership relationship. The BCA could not go into further detail about suppliers due to push back from the integrator to the corporation. Conflict management was not discussed by the BCA. The taxonomy showed an architecture must be in place with suppliers as conflict in business situation is a given especially since not every contingency can be covered in a contract and partnerships fail 50 to 85% of the time. Strategy must be considered for the position the corporation want to be in, not just leverage with suppliers. Operations is more than just working aircraft but the day to day workings that keep the aircraft fully mission capable.

4.8.6 The BCA and Metrics and Monitoring

Metrics were mentioned in terms of performance and on qualitative and quantitative data for all COAs. There was no mention of goods and services specifically. There was no indication of how metrics should be tailored, and for what they should be tailored for. Monitoring was not indicated. There were no recommendations for enforcements or who has the authority for enforcements.

The BCA acknowledges the need for metrics as does the taxonomy. However the taxonomy emphasizes the need for metric tailoring for good and services. Regardless of the decision there must be a metric involved to see if that decision is fulfilling the expectation and to be a management tool. With the increased use of monetary incentives in outsourcing monitoring has been de-emphasized. Metrics were mentioned in the BCA in terms of performance and on qualitative and quantitative data for all COA recommendations. As the production process evolves metrics will have to be tailored to meet those needs. This means metrics must change in order to keep up. There were no recommendations for enforcements or who has the authority for enforcements. Again this is more of an organizational management issue and would be beyond the scope of the BCA; however, they must be taken into account in the insourcing/outsourcing decision process.

In summary, the taxonomy revealed that metrics will have to evolve as the process evolves. Metrics for goods will differ from those for services. Metrics must be tailored for what they are measuring and are necessary as a management tool. Metrics were mentioned in the BCA in terms of performance and on qualitative and quantitative data

for all COA recommendations. The implication here is that a monetary incentive is used, and that outsourcing monitoring will continue to be de-emphasized.

4.8.7 The BCA and Time

Time is taken into consideration in the all the COAs suggested in the BCA in terms of life cycle and phases. Time, its abundance or scarcity, is in all categories. Although not expressed in the BCA, it is inherent and must be considered in all decision processes. If insourcing, is there enough time for the learning curve and still meet the deadlines for delivery and be at the right cost? Has enough time elapsed for a partnership type relationship to develop with a supplier? Has a potential partner spent enough time with the corporation to determine if that corporate culture and knowledge complements theirs? Laws and regulations change over time. Metrics and monitoring must evolve and adapt as requirements and technology changes over time.

In summary, the taxonomy revealed that time is inherent in all categories. Time spent with suppliers is necessary for relationships to develop, allow for learning curves, and knowledge to develop. The corporation must consider if it has enough time for these things should it decide to insource. The BCA only considers time as it relates to lifecycle phases.

4.8.8 The BCA and Trust

Not every contingency can be planned for, even in those cases where all information is known. The unexpected does happen that may affect cost, culture, knowledge, laws, relationships, metrics and monitoring. Corporate culture affects and effects trust between and among suppliers and customers. Trust is a key element in contracts because contracts in and of themselves are by their nature incomplete. Knowledge is oftentimes

incomplete especially if it is an emerging technology. Something must take the place of that incompleteness, that something is trust. The BCA did not mention trust. Trust cannot necessarily be quantified, only observed over time. Past history does not guarantee future performance, but it is a good indicator. Both parties must trust that the other will fulfill their obligations and not be opportunistic.

In summary, any insource/outsource decision must consider trust as not every contingency can be planned for. Trust can only be established over time and can only be based on past history with that supplier. This concept is subjective and was not considered in the BCA.

4.8.9 The BCA and Common goals

Common goals are necessary for any working relationship. They can be strategic or operational, for the short term or long term. Common goals decrease cost, must align with each corporate culture, complement each others knowledge, be legal, and promote accurate metrics. Goals common to each party are the precursors or drivers to forming long term relationships such as partnering. Partnership relationships are the most advantageous relationships for the corporation and supplier in terms of cost, knowledge, metrics and monitoring. However they do fail more often than not. It has been suggested that one reason why they fail is lack of common goals between the supplier and corporation.

Strategy is mentioned throughout the BCA and it can be assumed that this includes common goals. The corporation sponsoring this BCA realized the importance of strategy in the sustainment process, yet it was not fully utilized by the corporation. The COAs suggested by the BCA had varying strategies to use as leverage but not as a strategic

advantage. Leverage and strategic advantage could be utilized to the maximum benefit of the corporation and supplier for either the insource/outsource decision once common goals are established.

In summary common goals were not mentioned in the BCA. However for strategic partnerships to form and their potential benefits to be realized, the corporation and the supplier must have common goals. Common goals are drivers for partnership type relationships to form and necessary for their success. Since relationships were only alluded to in the BCA it follows reason that common goals would not be mentioned here.

4.8.10 The BCA and Cash Flow

Cash flow, not necessarily cost, is important in every category. It can hinder or speed up the process in all categories. Cash flow issues usually are symptoms or indicators of problems, not the problem itself. Money problems are rarely solved with more money. When used as a metric or a monitoring method it is not often an accurate measurement. While cash is important in the relationship, it is not the most important factor. It is standard industry practice for a product to be delivered first, then paid for several days later. The supplier should have the cash flow available to take care of business expenses while payment is being made. However the buyer can delay payment long enough which could put the supplier's finances in jeopardy. This gives the buyer some power in the relationship at this point. The supplier can delay delivery until payment is made. This gives the supplier power in the relationship. The relationship between the supplier and buyer should be such that the supplier trusts that payment will be made within a reasonable period of time and not be used as an opportunistic tool.

Cash flow is mentioned in the BCA in terms of an Internal Rate of Return (IRR) for a Net Present Value (NPV) type calculation.

> "The IRR is defined as the rate of return required to reach a neutral, or zero, Net Present Value (NPV). Once again, due to the nature of this BCA, there are not distinct cash inflows and outflows. In order to calculate IRR, the net cash inflow was considered as recurring savings for each year less the investment costs. Once the net cash flow was calculated for each year, the IRR was calculated. If an alternative did not have a negative cash flow year, an IRR could not be calculated, since IRR was calculated by paying back an initial cash outflow"

In summary cash flow for suppliers and how it directs their behavior toward the corporation is not mentioned in the BCA. Again such considerations are important in any make buy decision as it can indicate potential hold up problems with needed supplies..

Table 3 below shows the comparison of the categories, interwoven factors, caveats, and the BCA.

	BCA Table
Cost	well covered
EVA	not covered
EVM	not covered
PBL	well covered
Corporate Culture and Economic Environment	not covered
Antecedents	covered
Internal History	not covered
Program Manager	not covered
Competition	covered
Economic Environment	not covered
Few buyers and sellers	not covered
Perception of Success	not covered
Knowledge	covered
Loss of Knowledge	not covered
Core Competency	not covered
Technology Shocks	covered
Tacit Knowledge	not covered
Loss of performance	covered
Technical Knowledge	covered
Architecture	covered
DMSMS	covered
Laws and Regulations	covered
Contracts	covered
Contracts: cost plus fixed fee	covered
Appropriate terms are included in the contract document and enforced	not covered
UCAs	not covered
Redetermination and long term contracts	not covered
Title 10 50/50 law	covered
Core Capability	covered
Circular A 76	not covered
Control	covered
Residual and Specific rights	covered
Work is specified unambiguously	covered
Relationships	covered
Transactional/spot markets	not covered
Partnerships	not covered
Elements in partnerships	not covered
Conflict	not covered
Competitve advantage	not covered
Strategic	covered
Operational	covered
Metrics	not covered
Work can be monitored	not covered
Good (tangible)	not covered
Service (intangible)	not covered
Alignment of supply chain processes, network effectiveness, and goals and strategies	covered
Interwoven Factors	covered
Time	covered
Trust	not covered
Common goals	not covered
Cash flow	covered

Color Code
not covered
covered
well covered

Table 3:
Comparison of Taxonomic Categories, Interwoven Factors, Caveats, and the BCA

4.9 Summary of Results and Analysis of Taxonomy and BCA

This analysis concludes that the taxonomy included factors the BCA did not. Those factors were EVA, EVM, UCAs, DMSMS, economic environment, perceptions of success, partnerships, competitive advantage, conflict, trust, and common goals. Some of these are organizational management issues. The BCA's focus was on more quantitative type factors and not qualitative factors. Some factors in the taxonomy are not qualitative, and should have been considered in the BCA. Both qualitative and quantitative factors must be taken in to the insourcing decision making process.

Some factors were included in the BCA and the taxonomy but with different interpretations such as competition and cost. The BCA also included factors that the taxonomy did not. Based on the BCA the taxonomy can be used as a management tool in the insourcing decision process.

Chapter 5

Discussion

5.0 Future Research Recommendations

As this paper is a taxonomy, it stops short of developing a model. A decision matrix model can now be created and tested. Once a test model has been validated it can be a powerful management insourcing decision making tool.

End of life and disposal considerations could become a significant cost factor in the future as more environmental regulation is passed. If insourced, who would or should be responsible for it, the manufacturer or the customer? What of the waste that is produced in its production process and the waste its use generates? This is certainly an area of future research. Preliminary literature review findings did not uncover any information on this topic.

The culture of any organization is determined by the people who work there. With the people is also corporate memory and knowledge. Is there a high turnover rate in the supplier and corporation organizations? How does a high turnover rate effect the insourcing process? Does a high turnover rate in manpower increase vulnerability? These are organizational management issues but can have a profound effect on the make buy decision. More research is needed in this area to add to the taxonomy and model development.

Factors from the BCA could also be used to add to the taxonomy. This could also add to future framework and model development.

5.1 Limitations of the Taxonomy

This taxonomy is limited in the decision process in that it is a taxonomy only, not a tested model. In order for it to be a true management tool, the taxonomy needs to be created into a mode. Once the model is developed it must be evaluated.

End of life and disposal considerations were not included in this taxonomy. The literature search did not reveal any information on the topic. Disposal could become a significant cost factor in the future as more environmental regulation is passed. A true full lifecycle study for the insourcing decision should include end of life costs as well as who is responsible for it.

Risk is alluded to in the contracts and knowledge section, thought not plainly expressed. Risk is usually covered in the contract and subject to laws and regulations. As contracts are inherently incomplete, not all risks can be known. Since it can be a significant part of a managerial decision, consideration needs to be given to it as its own category.

5.3 Managerial Implications and Summary

Outsourcing has been a wide spread business practice recently because it was viewed as an economic way to get production accomplished. When using traditional accounting methods this would appear to be true. Outsourcing solved issues of immediate financial gain when calculating cost by traditional accounting methods and when the goal was only for the short term. Little thought was given beyond that to include long term financial gain, corporate strategy, and sustainment of the corporation.

Cost must be included in any decision. There are different ways to consider cost. Cost cannot be judged on traditional accounting methods for long term financial gain,

corporate strategy or long term sustainment of the corporation. If a corporation is outsourcing without regard to these true costs it can be an indicator of the financial health of the corporation. If a corporation is financially unstable it may outsource only to help the immediate short term bottom line. If so then the corporation has other issues as well as the insourcing decision. Cost must be considered in relation to the corporate strategy, long term financial gain and sustainment of the corporation.

Performance Based Logistics (PBLs) agreements are viewed as another method to outsource and get the most value for the cost. It is assumed that because the performance is what is paid for, the monetary incentive is enough to get the desired result. Increased use of a monetary incentive generally decreases monitoring. However, as with any contract, it must be monitored. If a contract is not monitored, it can leave parties vulnerable to opportunism. Another assumption with a PBL is that as the supplier gets better in the process they decrease their cost, increase efficiency, and pass those benefits onto the customer. However, upstream suppliers use the PBL to their own advantage by increasing their own profitability. The implication is that partnership relationships must be established with these upstream suppliers for the full advantage of PBL efficiency to be realized.

Partnerships do have a high failure rate; however, when they work the rewards are great. Communication to address conflict, and common goals are key. Before entering into such a relationship management needs to consider the drivers, facilitators, components, and outcomes (Lambert 2008).

The research shows that if a part of the process requires an area of expertise that the corporation has no experience with, outsourcing is better. However, this is only in the

best interest of the corporation when it is not part of the core competency and a small part in the production process. Even then a corporation must have substantial knowledge of that outsourced process in order to manage it, keep up with the technology changes that can affect their product, and maintain product performance. The best way to keep up with such knowledge is to keep it in house.

A good argument can be made that competition does not exist in the aerospace industry any more; therefore, a major benefit outsourcing taking advantage of competition in the marketplace is negated. A corporation may think it can control such a market by contracts. However the research has shown that contracts are inherently incomplete, not every contingency can be known or planned for.

Assuming that there is no true competition and that contracts are no guarantee of product delivery, what then should the decision be based on? Has enough time passed between the corporation and supplier that has allowed for a history to be developed between them? Was it a history that promoted trust? Do the corporation and supplier have common goals? Finally is there a cash flow between them that promotes time, trust, and common goals?

In conclusion, there is only so much analysis that can be done when making an insourcing decision. Ultimately what must be decided by management is, does the corporation want to invest the time and trust, develop common goals, and have the cash flow that are interwoven in the six categories for insourcing.

Appendix A

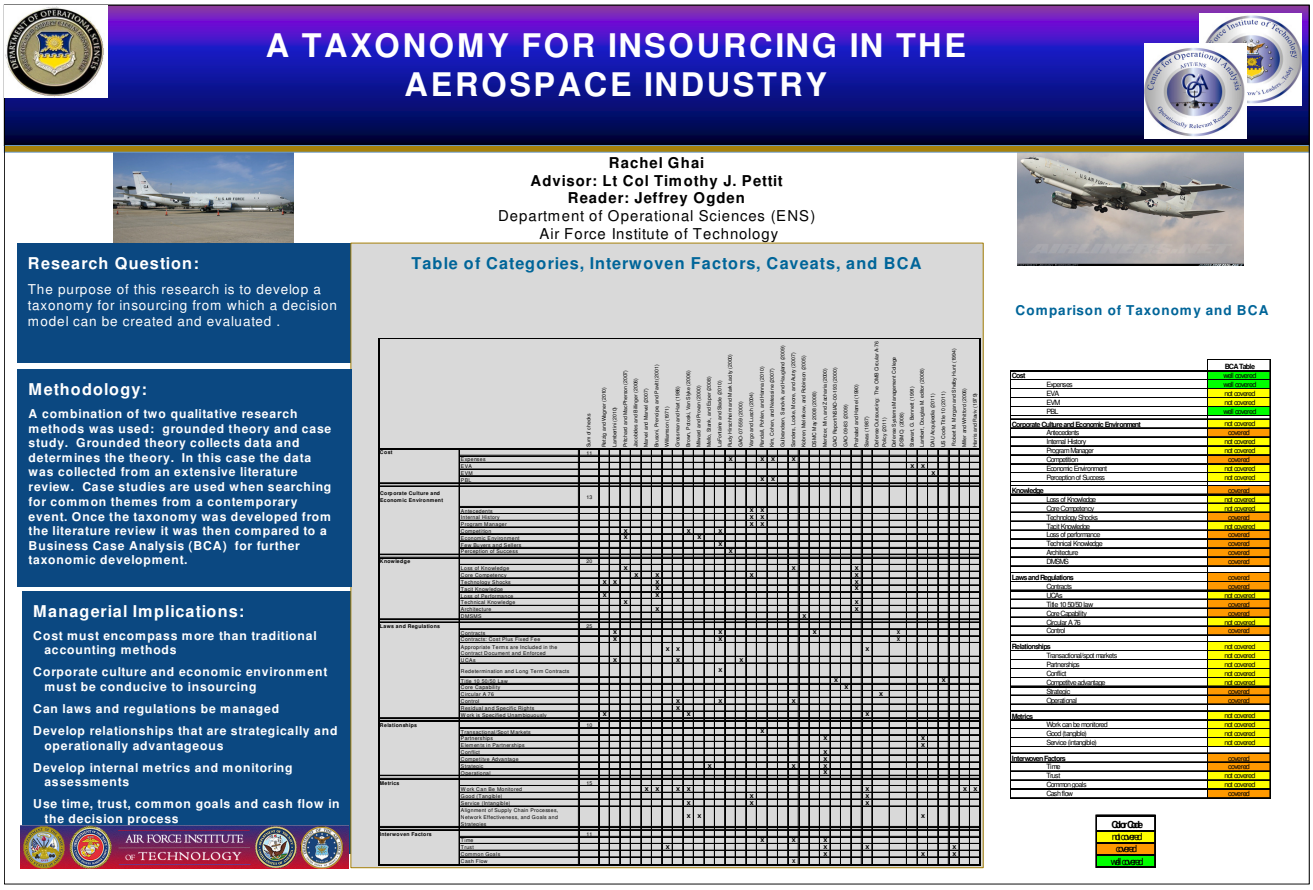
Blue Dart

The executive and legislative branches agree that there has been too much outsourcing of government work in the past. The best option is a combination of insourcing and outsourcing, which has traditionally been the way the government has conducted business. Bringing a service back in house or insourcing as it is known, is a difficult decision that cannot be based on cost alone. Cost does not reveal the whole picture and it would suggest that the decision to outsource should not be based only on cost. Ultimately the question is under what conditions should a process or service be insourced? The Office of Management and Budget (OMB) circulars and Government Accounting Office (GAO) reports provide general guidelines for such decision making but nothing truly definitive. There is current literature suggesting frameworks for the various aspects of the process, but no framework exists for the entire process. The purpose of this paper is to develop a taxonomy so that a decision framework can be developed that considers the optimal solution for the long term financial gain, corporate strategy, and continued sustainment of the corporation in the insource/outsource decision process.

A review of current literature for this paper suggests that such a decision needs to be based on six categories: cost, corporate knowledge and economic environment, knowledge, laws and regulations, relationships, and metrics and monitoring. These are quantifiable factors that a manager can base the decision on. However the insourcing decision must also consider factors that are not quantifiable or predictable. They are time, trust, common goals, and cash flow.

Appendix B

Quad Chart



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14. ABSTRACT

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